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SPECIFICATION FOR ONE-MARK PIPETTES

(First Revision)

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Indian Standard

SPECIFICATION FOR ONE-MARK PIPETTES

(First Revision)

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(*Continued on page* 2)

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SPECIFICATION FOR ONE-MARK PIPETTES

(First Revision)

0. FOREWORD

0.1 This Indian Standard (First Revision) was adopted by the Indian Standards Institution on 30 June 1975, after the draft finalized by the Laboratory Glassware and Related Apparatus Sectional Committee had been approved by the Chemical Division Council.

0.2 This standard was first published in 1958. However, keeping in view the trend at the level of the International Organization for Standardization (ISO) followed in ISO/R 648-1968 'One-mark pipettes' in prescribing closer tolerances on capacities and proportionate delivery time and bringing about uniformity in the finish of pipettes, the Sectional Committee responsible for the preparation of this standard decided to revise it.

0.3 In this standard the unit of volume used is cubic centimetre (cm^3) for which the term 'millilitre (ml)' may be used as an equivalent in reference to capacities of volumetric glassware. In this revision pipettes of nominal capacities 0·5 and 200 ml have been included and those of capacities 3, 4, 15, 30, 35, 40 and 70 ml have been excluded. Further, the 0·5-ml pipette has been specified without bulb, the 1-ml pipette both with and without bulb, and the 2-ml pipette with bulb for Class of accuracy A and both with and without bulb for Class of accuracy B. All the remaining sizes have been specified with bulb only.

0.4 This standard contains clauses 4.2, 5.1.1 and 6.2 which provide for agreement between the purchaser and the supplier.

0.5 For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test, shall be rounded off in accordance with IS : 2-1960*. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

1. SCOPE

1.1 This standard prescribes requirements and methods of sampling and test for one-mark pipettes suitable for general laboratory purposes.

---

*Rules for rounding off numerical values (*revised*).

2. TERMINOLOGY

2.1 For the purpose of this standard, the definitions given in IS:1382-1961* in addition to the following, shall apply.

2.1.1 *Nominal Capacity* — The volume of water at 27°C in cubic centimetres (cm^3), or in millilitres (ml), delivered by the pipette at 27°C as prescribed in Appendix A.

2.1.2 *Delivery Time* — The time taken by the free descent of the water meniscus from the graduation mark to the point at which it appears to come to rest in the jet as prescribed in Appendix A.

3. CLASSES

3.1 One-mark pipettes shall be of two classes of accuracy, namely, Class A and Class B (*see* Table 1).

4. NOMINAL CAPACITIES AND ACCURACY

4.1 Nominal Capacities — The pipettes shall be of the following nominal capacities:

0·5, 1, 2, 5, 10, 20, 25, 50, 100 and 200 cm^3 (ml).

4.2 Accuracy — The capacity of the pipettes, when determined in accordance with the 'Indian Standard Tables for calibration and method of verification of volumetric glassware (*under preparation*)', following the method of delivery of water prescribed in Appendix A, shall not differ from the nominal capacity by more than the maximum permitted tolerance shown in Table 1.

Note — Till the standard under preparation is published, the capacity of the pipettes shall be determined as agreed to between the purchaser and the supplier.

5. REQUIREMENTS

5.1 Material — The pipettes shall be made of colourless glass not having any pronounced tint. They shall be as free as possible from visible defects and shall be reasonably free from internal strain.

5.1.1 *Limit of Alkalinity* — When graded according to 2 of IS : 2303-1963†, the glass used for the pipettes of Class A shall conform to Type 1 and that used for the pipettes of Class B shall conform to Type 1, 2 or 3 as agreed to between the purchaser and the supplier.

---

*Glossary of terms relating to glass industry.
†Method of grading glass for alkalinity.

TABLE 1 MAXIMUM PERMITTED TOLERANCES ON CAPACITIES

(*Clauses* 3.1 *and* 4.2)

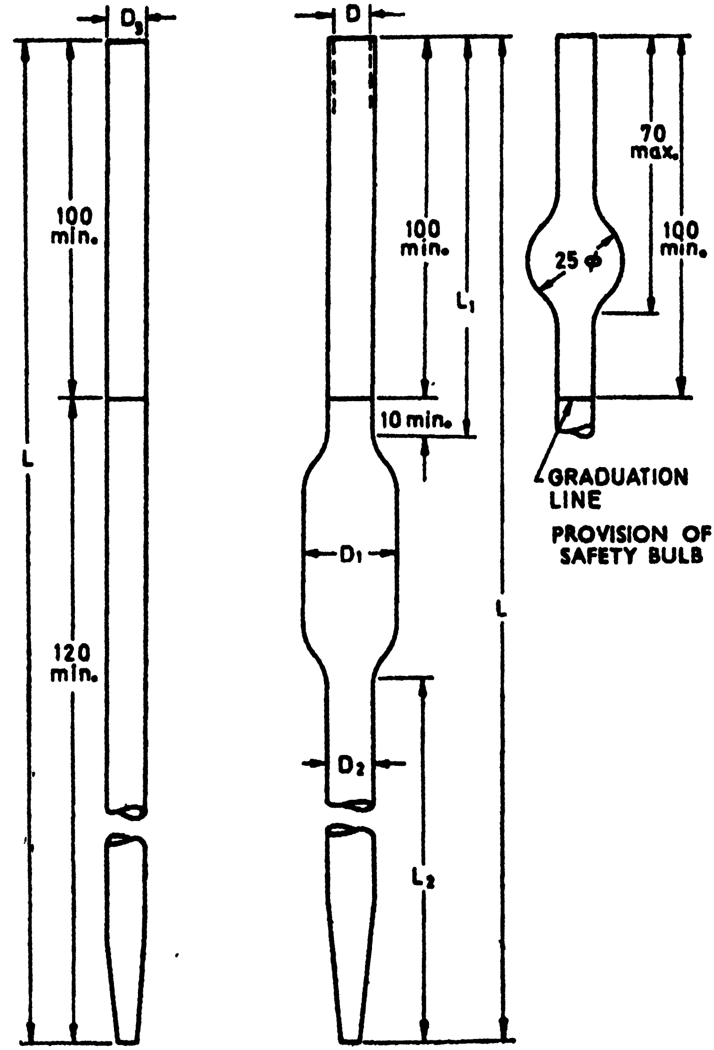
Sl No.	Nominal Capacity	Maximum Permitted Tolerance	
		Class A	Class B
(1)	(2)	(3)	(4)
	cm^3 (ml)	cm^3 (ml)	cm^3 (ml)
i)	0·5	±0·005	±0·01
ii)	1	±0·007	±0·015
iii)	2	±0·010	±0·02
iv)	5	±0·015	±0·03
v)	10	±0·02	±0·04
vi)	20	±0·03	±0·06
vii)	25	±0·03	±0·06
viii)	50	±0·05	±0·10
ix)	100	±0·08	±0·16
x)	200	±0·10	±0·20

5.2 Pattern — The pipettes shall conform to the patterns 1 or 2, shown in Fig. 1, depending on the class of accuracy and nominal capacity, as given in Table 2.

TABLE 2 PATTERNS OF PIPETTES

(*Clause* 5.2)

Sl No.	Class of Accuracy	Nominal Capacity, cm^3 (ml)	Pattern
(1)	(2)	(3)	(4)
i)	A	0·5 or 1	1
ii)	A	1, 2, 5, 10, 20, 25, 50, 100, or 200	2
iii)	B	0·5, 1, or 2	1
iv)	B	1, 2, 5, 10, 20, 25, 50, 100, or 200	2



PATTERN 1
(WITHOUT BULB)

PATTERN 2
(WITH BULB)

All dimensions in millimetres.

FIG. 1 ONE-MARK PIPETTES

5.3 Workmanship and Finish — The pipettes of Pattern 1 shall consist of a straight tube with a jet at the lower end. The pipettes of Pattern 2 shall consist of a bulb with suction and delivery tubes, the three portions being straight and co-axial. If a safety bulb is provided (*see* Fig. 1), it shall be of approximately spherical form and be situated between the graduation line and the top of the pipette in accordance with the dimensions given in Table 3.

5.3.1 *Top of Pipette* — The top of the pipette shall be finished square with the axis of the pipette and shall be free from any blemishes which might interfere with the control by the finger in setting the meniscus at the graduation line.

NOTE — The end may be lightly fire-polished or smoothly ground with a slight bevel on the outside.

5.3.2 *Bulb* — The main portion of the bulb, where provided, shall be cylindrical. The two ends of the bulb shall emerge gradually into the suction and the delivery tubes, the junction being of a tapered formation to facilitate drainage.

NOTE — Pattern 2 pipettes of 1 and 2 cm^3 (ml) nominal capacities may have an oval bulb, if desired.

5.3.3 *Delivery Jet* — The lower end of the pipette shall terminate in a delivery jet having a gradual taper without any sudden constriction at the orifice. The end of the jet shall preferably be ground smooth, square with the axis and slightly bevelled on the outside. Alternatively, the end may be finished by fire-polishing, provided that the requirement specified in the first sentence of this clause is met.

5.4 Dimensions — The pipettes shall comply with the dimensional requirements given in Tables 3 and 4.

5.5 Delivery Time — The delivery time in seconds, when determined in accordance with the method prescribed in Appendix A, shall be within the limits prescribed in Table 5.

5.5.1 The difference between the observed delivery time and the inscribed delivery time shall not exceed the maximum permissible stated in Table 5.

5.6 Graduation Line — The graduation line shall be a clear, permanent, uniform line completely encircling the tube and having a thickness not exceeding 0·4 mm. The line shall be in a plane at right angles to the longitudinal axis of the pipette. Dimensions limiting the position of the graduation line on the pipette are given in Table 3.

TABLE 3 DIMENSIONS APPLYING TO ALL CAPACITIES OF PIPETTES

(*Clauses* 5.3, 5.4 *and* 5.6, and *Fig.* 1)

SL No. (1)	DIMENSION (2)	REQUIREMENT (3) mm
i)	Distance of graduation line from top of pipette, *Min*	100
ii)	Distance from graduation line to top of bulb (for Pattern 2 only), *Min*	10
iii)	Distance from graduation line to tip of jet (for Pattern 1 only), *Min*	120
iv)	Wall thickness:	
	a) Pattern 2 pipettes of 1 and 2 cm^3 (ml) capacities, *Min*	0·7
	b) Other pipettes, *Min*	1·0
v)	Diameter of safety bulb (if provided)	25
vi)	Distance from top of pipette to bottom of safety bulb, *Max*	70

5.7 Visibility of Graduation Line, Figures and Inscriptions — The graduation line, figures and inscriptions shall be clearly visible and permanent. The figures and inscriptions shall be of such size and form as to be clearly legible under normal conditions of use.

6. MARKING AND PACKING

6.1 Marking

6.1.1 Each one-mark pipette shall be marked with the following:

a) Manufacturer's name or recognized trade-mark, if any;

b) The inscription 'Ex', to indicate that the pipette has been adjusted to deliver its indicated capacity, followed by nominal capacity and the symbol 'cm^3' or 'ml';

c) The inscription '27°C' to indicate the standard reference temperature;

d) If desired, the coefficient of cubical thermal expansion of glass of which the pipette is made; and

e) The letter 'A' or 'B' to indicate the class of accuracy of the pipette.

TABLE 4 DIMENSIONS APPLYING TO INDIVIDUAL CAPACITIES OF PIPETTES

(*Clause* 5.4, and *Fig.* 1)

Sl No.	NOMINAL CAPACITY	PATTERN 1 (*see* FIG. 1)		PATTERN 2 (*see* FIG. 1)					
		Overall Length (L) *Max*	External Diameter of Tube (D_3) *Max*	Overall Length (L) *Max*	Length of Suction Tube (L_1) *Min*	Length of Delivery Tube (L_2) *Min*	Internal Diameter of Suction Tube (D_1) *Max*	External Diameter of Bulb (D_2) *Max*	External Diameter of Delivery Tube(D_3)
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	cm³ (ml)	mm	mm	mm	mm	mm	mm	mm	mm ±1·5
i)	0·5	280	5·0	—	—	—	—	—	—
ii)	1	280	6·0	325	150	110	3·0	9	5·5
iii)	2	280	7·0	350	150	125	3·5	9	5·5
iv)	5	—	—	410	150	145	4·0	12	6·5
v)	10	—	—	450	160	160	4·5	16	6·5
vi)	20	—	—	520	170	210	5·5	22	7·0
vii)	25	—	—	530	170	220	5·5	24	7·0
viii)	50	—	—	550	170	230	6·0	30	7·5
ix)	100	—	—	600	170	240	7·5	38	8·0
x)	200	—	—	650	170	240	8·5	49	9·0

TABLE 5 DELIVERY TIME (IN SECONDS) FOR PIPETTES

(*Clauses* 5.5 *and* 5.5.1)

SL No.	NOMINAL CAPACITY	DELIVERY TIME				PERMISSIBLE DIFFERENCE BETWEEN OBSERVED AND INSCRIBED DELIVERY TIMES, *Max*
		Class A		Class B		
		Min	*Max*	*Min*	*Max*	
(1)	(2)	(3)	(4)	(5)	(6)	(7)
	cm³ (ml)	s	s	s	s	s
i)	0·5	10	20	7	20	2
ii)	1	10	20	7	20	2
iii)	2	10	25	7	25	2
iv)	5	15	30	10	30	3
v)	10	15	40	10	40	3
vi)	20	25	50	20	50	4
vii)	25	25	50	20	50	4
viii)	50	30	60	20	60	5
ix)	100	40	60	30	60	5
x)	200	50	70	40	70	5

6.1.2 The following additional inscriptions shall be permanently marked on Class A pipettes intended for official verification or certification:

a) An identification number, and

b) The delivery time in seconds.

6.1.2.1 These inscriptions should preferably be marked on other Class A pipettes, and may also be used, if desired, on Class B pipettes.

6.1.3 Each pipette may also be marked with the ISI Certification Mark.

NOTE — The use of the ISI Certification Mark is governed by the provisions of the Indian Standards Institution (Certification Marks) Act and the Rules and Regulations made thereunder. The ISI Mark on products covered by an Indian Standard conveys the assurance that they have been produced to comply with the requirements of that standard under a well-defined system of inspection, testing and quality control which is devised and supervised by ISI and operated by the producer. ISI marked products are also continuously checked by ISI for conformity to that standard as a further safeguard. Details of conditions under which a licence for the use of the ISI Certification Marks may be granted to manufacturers or processors may be obtained from the Indian Standards Institution.

6.2 Packing — The pipettes shall be packed as agreed to between the purchaser and the supplier.

7. SAMPLING

7.1 The method of sampling the pipettes and the criteria for ascertaining their conformity shall be as prescribed in IS : 4426-1967*.

APPENDIX A

(*Clauses* 2.1.1, 2.1.2, 4.2 *and* 5.5)

DETERMINATION OF CAPACITY, ACCURACY AND DELIVERY TIME OF PIPETTES

A-1. PROCEDURE

A-1.1 Clean the pipette to remove any adhering dirt or grease. Fill it with distilled water (*see* IS : 1070-1960†) at ambient temperature to a few millimetres above the graduation line. Then hold it in a vertical position, and adjust the falling meniscus to the graduation line as given below:

a) Set the meniscus so that the plane of the top edge of the graduation line is horizontally tangential to the lowest point of the meniscus, the line of sight being in the same plane; and

b) Remove any drop adhering to the jet of the pipette by bringing the surface of a glass vessel into contact with the tip of the jet.

A-1.2 Start the stop watch and simultaneously deliver the water thus measured into another clean and tared glass vessel slightly inclined so that the tip of the jet is in contact with the inside of the vessel, but without movement of the one against the other throughout the delivery and waiting periods.

A-1.3 Allow the pipette to empty until the meniscus comes to rest in the jet. Stop the watch and note the time. Preserve the delivered water for determination of capacity and accuracy as prescribed in 4.2.

NOTE — To ensure that the delivery is complete, a waiting period of approximately 3 seconds be observed before removing the pipette from contact with the receiving vessel.

The waiting period of approximately 3 seconds is specified only for the purpose of definition and verification of accuracy. In use it is unnecessary to adhere closely to the period; it is sufficient to be certain that the meniscus has come to rest in the jet before removing the pipette from contact with the receiving vessel.

A-1.4 The pipette shall be considered to have satisfied the requirement for delivery time if the noted time is within the limits specified in Table 5.

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*Methods of sampling laboratory glassware and medical glass instruments.

†Specification for water, distilled quality (*revised*).

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AMENDMENT NO. 1 APRIL 2001
TO
IS 1117 : 1975 SPECIFICATION FOR ONE-MARK PIPETTES

(First Revision)

(*Page* 3, *clause* 0.4, *line* 1) — Delete 4.2.

(*Page* 4, *clause* 4.2) — Substitute the following for the existing clause:

'4.2 Accuracy — The capacity of the pipettes, when determined in accordance with IS 8897 : 1978‡, following the method of delivery of water prescribed in Annex A, shall not differ from the nominal capacity by more than the maximum permitted error prescribed in Table 1.'

(*Page* 4, *footnote*) — Insert the following footnote at the end:

'‡Tables for calibration and method of verification of volumetric glassware.'

(*Page* 5, *Table* 1, *Title*) — Substitute 'TABLE 1 MAXIMUM PERMITTED ERROR ON CAPACITIES' *for* 'TABLE 1 MAXIMUM PERMITTED TOLERANCES ON CAPACITIES'.

(*Page* 5, *Table* 1, *col* 3 *and* 4, *heading*) — Substitute 'MAXIMUM PERMITTED ERROR IN CAPACITY' *for* 'MAXIMUM PERMITTED TOLERANCE'.

(*Page* 10, *clause* 6.1.3) — Substitute the following for the existing:

'6.1.3 *BIS Certification Marking*

Each pipette may also be marked with the Standard Mark.

6.1.3.1 The use of the Standard Mark is governed by the provisions of the *Bureau of Indian Standards Act*, 1986 and the Rules and Regulations made thereunder. The details of conditions under which the licence for the use of the Standard Mark may be granted to manufacturers or producers may be obtained from the Bureau of Indian Standards.'

(CHD 11)

Reprography Unit, BIS, New Delhi, India

AMENDMENT NO. 2 JULY 2007
TO
IS 1117 : 1975 SPECIFICATION FOR ONE-MARK PIPETTES

(First Revision)

(*Page* 4, *clause* **5.1.1**) — Substitute the following for the existing clause

'**5.1.1** *Limit of Alkalinity* — When graded according to the method prescribed in IS 2303 (Part 1/Sec 1) 1994†, the glass used for the pipettes of Class A shall conform to Class HGB 1 and that used for the pipettes of Class B shall conform to Class HGB 1, HGB 2 or HGB 3 as agreed to between the purchaser and the supplier '

(*Page* 4, *footnote marked* †) — Substitute the following for the existing

'†Grading glass for alkalinity Part 1 Hydrolytic resistance, Section 1 Hydrolytic resistance of glass grains at 98°C Method of test and classification (*first revision*) '

(CHD 10)

Reprography Unit, BIS, New Delhi, India